Poor quality water use in WSAC applications

Niagara Wet Surface Air Coolers (WSAC®) case study

The challenge

Increase cooling duty while reducing fresh water consumption.

The solution

Provide a custom designed Niagara Wet Surface Air Cooler (WSAC®) to use reverse osmosis (RO) reject, steam reject, cooling tower blowdown, or sea water as makeup water sources.

Advantages

- Increase cooling duty
- Reduce fresh water consumption
- Lowest possible process outlet temperature
- Reduce total system blowdown
- Exotic materials for long service life

What is a WSAC?

Alfa Laval Niagara Wet Surface Air Coolers (WSAC®) are efficient closed-loop, evaporative cooling systems designed for the power, process, wastewater, natural gas and petrochemical industries.

These fluid cooling and vapor condensing systems are optimized for industrial applications where rugged designs, and cost-effective, efficient closed-loop cooling and condensing duties are required.

NIAGARA
Wet Surface Air Coolers

Poor quality water use applications

Alfa Laval Niagara WSAC systems provide solutions to poor quality water challenges in many applications and industries as shown in the case study examples below.

Steel company—St. Paul, MN

Unit description—Carbon steel, galvanized outside only, tubes. The current unit is nearly 10 years old and was a replacement for a Niagara unit that was in service for 21 years.
Makeup water—Well water with alkalinity 308 mg/l, total hardness 290 mg/l, TDS 329 mg/l, conductivity 496 mohm/cm, pH 7.7
Cycles of concentration—This unit has no blowdown
Water treatment—The customer dumps a 55 gallon drum of citric de-acid into the basin of the unit 4 times a year and shovels the solids out once a year.

Automotive company—Cleveland, OH

Unit description—10 model A4409 units and 5 model A4415 units. Most units have carbon steel, galvanized outside only, tubes. New units were supplied with 304 stainless steel tubes. The oldest units have been in service for almost 20 years and the newest for 6 years. Units are used for induction furnace jacket cooling
Makeup water—Municipal source, typical hardness 220mg/l and TDS 280 mg/l
Cycles of concentration—10-12 cycles
Water treatment—None. Aside from mild biological growth there are no signs of fouling.

Steel company—Hamilton, Ontario, Canada

Unit description—304 stainless steel tubes. First unit has been in operation for over 22 years, the second for over 7 years. Units are used for primary and secondary coke plant scrubber liqueur cooling.
Makeup water—Cooling tower blowdown. Water is taken from Burlington Bay and treated with a mild biocide and dispersant and used as cooling tower makeup. It is taken out of the cooling tower after 4-6 cycles of concentration and taken directly into the WSAC.
Cycles of concentration—4-6 more cycles in the WSAC, 8-12 overall.
Water treatment—None

Power plant—Kirkland Lake, Ontario, Canada

Unit description—Tubes are carbon steel galvanized on the outside only. Unit is used for vacuum steam condensing for power generation. Unit has been in continuous operation for over 15 years.
Makeup water—Municipal sewage plant effluent
Cycles of concentration—7-10 cycles
Water treatment—Unknown

Coke plant—Indianapolis, IN

Unit description—304 Stainless Steel. Unit is used for primary liquor cooling (high fouling) and has been in continuous operation for over 17 years.
Makeup water—Municipal with total hardness of 320 mg/l.
Cycles of concentration—3 cycles
Water treatment—For approximately 15 years this unit was pH monitored and treated with ortho phosphate.

Power plant—Lakeland, FL

Unit description—Four large field-erected concrete basin units that act as an auxiliary cooler. The system has been in continuous operation for over 10 years.
Makeup water—Cooling tower blowdown water
Cycles of concentration—6.5-7 cycles
Water treatment—Corrosion inhibitor 11-635A is added (phosphate, bleach, acid)

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